UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
ADAMS, CHARLES D

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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/19/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>27 September 2006</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-6</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-6</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All .b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Remarks

1.   In response to communications filed on 27 September 2006, claims 1-3 are

amended. Claims 1-6 are pending in the application.

Claim Rejections - 35 USC § 101

2.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of
> matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the
> conditions and requirements of this title.

3.   Claims 1-6 are rejected under 35 U.S.C. 101 because the claims do not currently

have a useful result. The claimed limitation "accessing said data elements" does not

necessarily result in the data elements, organized according to said Hilbert curve, being

displayed or output to a user.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

5.   Claims 1-4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Lawder et al. ("Querying Multi-Dimensional Data Indexed Using the Hilbert Space-

Filling Cruve") in view of Pruett et al. (US Patent 4,837,845).

As to claim 1, <u>Lawder et al</u>. teaches a database system for organizing data

elements according to a Hilbert curve, said data elements being representable by a

plurality of coordinates (see <u>Lawder et al</u>. section 1, column 2, 1st paragraph, said data

system comprising:

First means for generating a plurality of bitblocks by bitwise interleaving the

coordinates of the data elements (see <u>Lawder et al</u>., sections 2 and 3. A Hilbert space

filling curve will visit all the points in a k dimensional grid exactly once without cross

itself. By the virtue of the Hilbert curve's path, the data elements will be interleaved.

Figure 1 shows data rectangles wherein the path of the Hilbert curve isn't along a single

axis in a Cartesian coordinate system. If you consider the origin to be the bottom left

(element 0), then you will have the elements arranged in the order of (0, 0), (1, 0), (1, 1),

(0, 1). As shown in section 3 with regards to Figure 2, "each node corresponds to a first

order curve", therefore each "node" could be called a bitblock);

<u>Kamel et al</u>. does not teach second means for applying a fliprot transformation to

a first bitblock;

<u>Pruett et al</u>. teaches second means for applying a fliprot transformation to a first

bitblock (see Figure 3.2. A Y-Flip is followed transpose, result in a rotation. However, in

the case the examples in Figure 3.2, with a 2x2 grid, a transpose is a rotation);

Said fliprot transformation comprising a flip transformation and a rotation

transformation (see <u>Pruett et al</u>. Figure 3.2. A Y-Flip is followed transpose, result in a

rotation. However, in the case the examples in Figure 3.2, with a 2x2 grid, a transpose

is a rotation) ,

Said flip transformation inverting bits of said first bitblock, said rotation

transformation interchanging bits of said fist bitblock (see Pruett et al. Figure 3.2. A Y-

Flip is followed transpose, result in a rotation. However, in the case the examples in

Figure 3.2, with a 2x2 grid, a transpose is a rotation);

Third means for obtaining, for each further bitblock, a fliprot transformation by a

concatenation of two or more fliprot transformations (see Pruett et al. 5:37-6:2. The grid

in Pruett et al. is subdivided into smaller and smaller sections, each undergoing

transformation);

Fourth means for applying fliprot transformations to their corresponding bitblock

(see Figures 3.1 5:37-6:2);

Fifth means for accessing said data elements (see Lawder et al. section 1,

column 2, 1st paragraph. "this paper reports on a technique which has successfully been

developed as part of the design and implementation of the first fully functioning data

storage and retrieval application utilizing the Hilbert Curve");

Whereby the bitblocks determine the organization of said data elements

according to said Hilbert curve (see Lawder et al. section 1, column 2, 1st paragraph. As

shown in section 3 with regards to Figure 2, "each node corresponds to a first order

curve", therefore each "node" could be called a bitblock).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to have modified Lawder et al. in view of Pruett et al.,

since <u>Pruett et al</u>. teaches that "The problem is clearly one of mapping eight bytes of

data into another eight bytes. The rotation problem can be reduced to two parts:

rearranging the bytes, and obtaining the transpose of an 8x8 block of bits (See Fig. 3.1

and 3.2). The embodiments of the present invention demonstrate efficient means for

achieving this objective" (see 4:40-46).

As to claim 2, <u>Kamel et al</u>. teaches a method of organizing data elements of a

database according to a Hilbert curve, said data elements being representable by a

plurality of coordinates (see <u>Lawder et al</u>. section 1, column 2, 1st paragraph), said

method comprising the following steps:

Generating a plurality of bitblocks by bitwise interleaving the coordinates of the

data elements, applying a predetermined fliprot transformation to a first bitblock (see

<u>Lawder et al</u>., sections 2 and 3. A Hilbert space filling curve will visit all the points in a k

dimensional grid exactly once without cross itself. By the virtue of the Hilbert curve's

path, the data elements will be interleaved. Figure 1 shows data rectangles wherein the

path of the Hilbert curve isn't along a single axis in a Cartesian coordinate system. If

you consider the origin to be the bottom left (element 0), then you will have the

elements arranged in the order of (0, 0), (1, 0), (1, 1), (0, 1). As shown in section 3 with

regards to Figure 2, "each node corresponds to a first order curve", therefore each

"node" could be called a bitblock);

Said fliprot transformation comprising a flip transformation and a rotation

transformation (see <u>Pruett et al</u>. Figure 3.2. A Y-Flip is followed transpose, result in a

rotation. However, in the case the examples in Figure 3.2, with a 2x2 grid, a transpose
is a rotation),

Said flip transformation inverting bits of said first bitblock, said rotation
transformation interchanging bits of said first bitblock (see Pruett et al. Figure 3.2. A Y-
Flip is followed transpose, result in a rotation. However, in the case the examples in
Figure 3.2, with a 2x2 grid, a transpose is a rotation);

For each further bitblock, obtaining a fliprot transformation by a concatenation of
two or more fliprot transformations (see Pruett et al. 5:37-6:2. The grid in Pruett et al. is
subdivided into smaller and smaller sections, each undergoing transformation);

Applying fliprot transformations to their corresponding bitblock (see Figures 3.1
5:37-6:2); and

Accessing said data elements (see Lawder et al. section 1, column 2, 1st .
paragraph. "this paper reports on a technique which has successfully been developed
as part of the design and implementation of the first fully functioning data storage and
retrieval application utilizing the Hilbert Curve");

Whereby the bitblock bits determine the organization of said data elements
according to said Hilbert curve (see Lawder et al. section 1, column 2, 1st paragraph.
Also see section 3 with regards to Figure 2, "each node corresponds to a first order
curve", therefore each "node" could be called a bitblock).

Therefore, it would have been obvious to one of ordinary skill in the art at the
time the invention was made to have modified Lawder et al. in view of Pruett et al.,
since Pruett et al. teaches that "The problem is clearly one of mapping eight bytes of

data into another eight bytes. The rotation problem can be reduced to two parts:

rearranging the bytes, and obtaining the transpose of an 8x8 block of bits (See Fig. 3.1

and 3.2). The embodiments of the present invention demonstrate efficient means for

achieving this objective" (see 4:40-46).

As to claim 4, Lawder et al. as modified teaches wherein organizing is a means

for at least one of searching, sorting, storing, retrieving, inserting, deleting, querying,

range querying, data elements in said database system (see Lawder et al., section 1,

column 2, 1st paragraph, "this paper reports on a technique which has successfully been

developed as part of the design and implementation of the first fully functioning data

storage and retrieval application utilizing the Hilbert Curve". Data can be stored).

As to claim 5, Lawder et al. as modified teaches the method of claim 2 for range

querying data elements in said database, with a BIGMIN calculation including a

candidate calculation wherein said candidate is kept in form of rectangle data (see

Lawder et al. section 5.3. A "Max-lower" and "Min-Higher" is calculated. Testing of

values is done on the derived-keys of a subset of quadrants. Therefore, candidates are

calculated in the form of rectangle data).

As to claim 6, Lawder et al. as modified teaches a computer-readable data

storage medium for storing program code for executing, when being loaded into a

computer, the method according to claim 2 (see Pruett et al., 4:4-17).

Response to Arguments

6.   Applicant's arguments filed 27 September 2006 have been fully considered but

they are not persuasive.

Applicant argues that "accessing said data elements" overcomes the 101

rejection by providing a useful result. However, the claimed limitation "accessing said

data elements" does not necessarily result in the data elements, organized according to

said Hilbert curve, being queried by a user or displayed or output to a user.

Conclusion

7.   Applicant's amendment necessitated the new ground(s) of rejection presented in

this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Charles D. Adams whose telephone number is (571)

272-3938. The examiner can normally be reached on 8:30 AM - 5:00 PM, M - F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Charles Rones can be reached on (571) 272-4085. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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